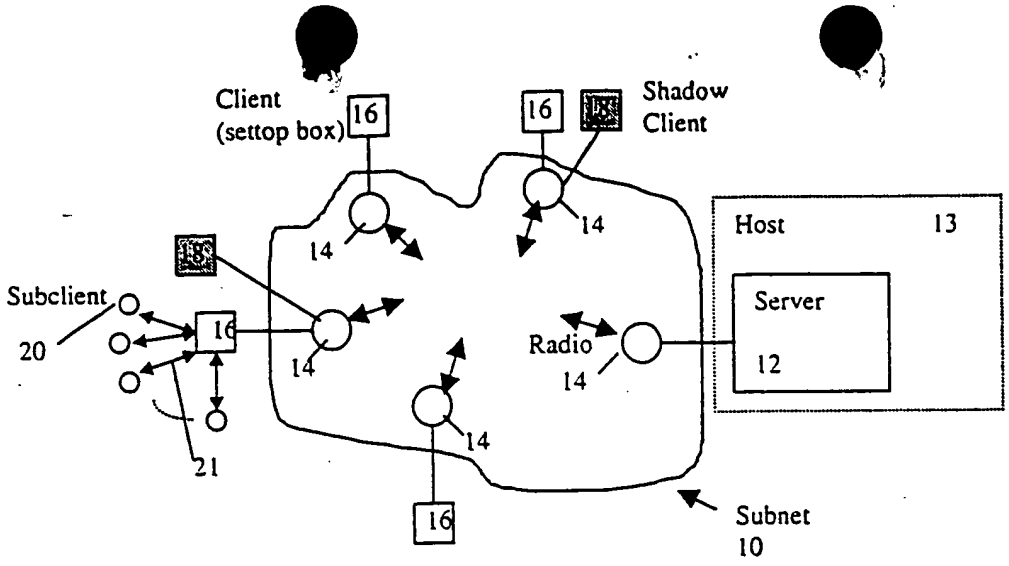

Client
(settop box)
16
16
Shadow
Client
14
14
Host
13
Server
12
Subclient
20
16
14
Radio
14
14
21
16
Subnet
10

Fig. 1

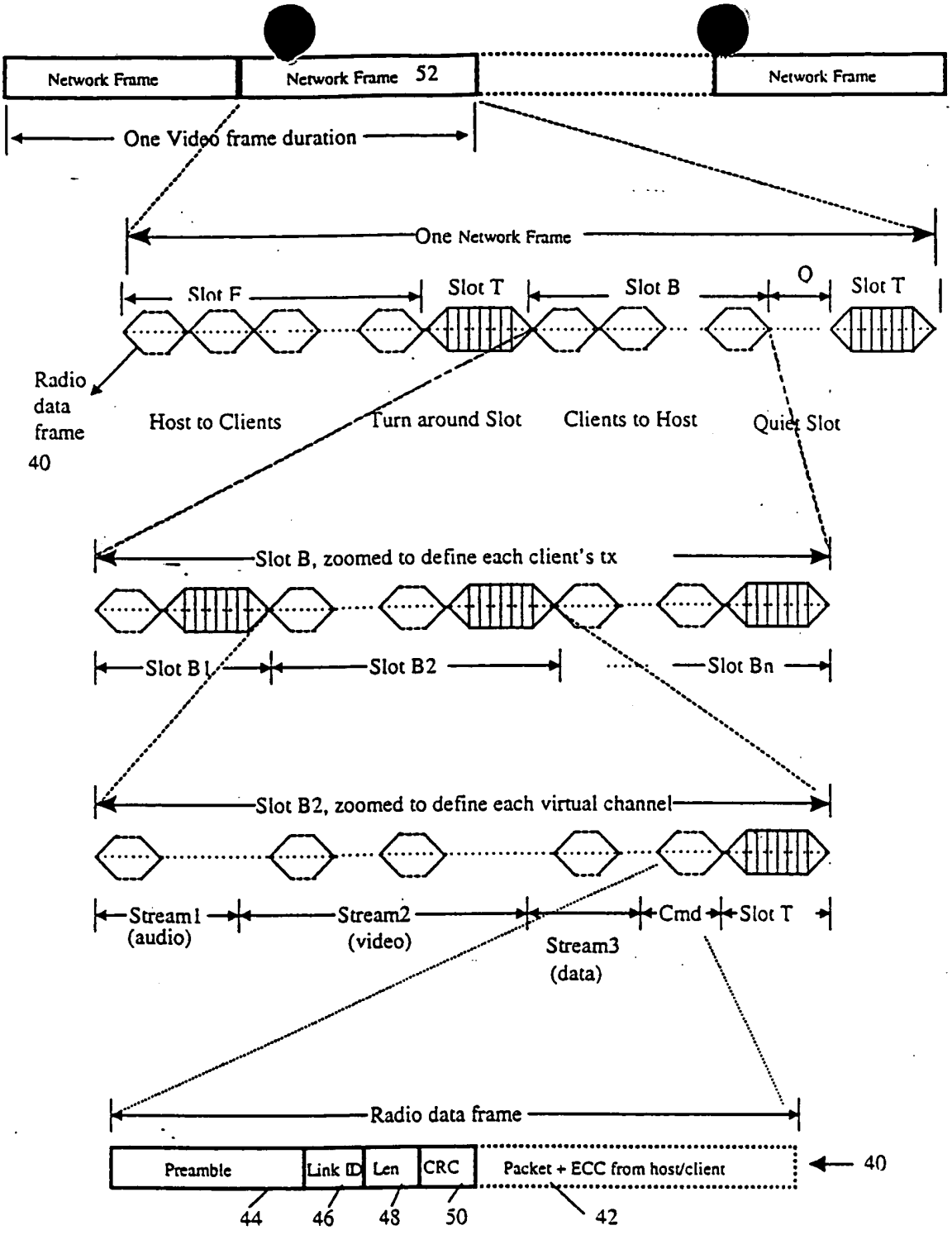

Network Frame
Network Frame 52
Network Frame
One Video frame duration
One Network Frame
Slot F
Slot T
Slot B
Slot T
Radio data frame 40
Host to Clients
Turn around Slot
Clients to Host
Quiet Slot
Slot B, zoomed to define each client's tx
Slot B1
Slot B2
Slot Bn
Slot B2, zoomed to define each virtual channel
Stream1 (audio)
Stream2 (video)
Stream3 (data)
Cmd
Slot T
Radio data frame
Preamble
Link ID
Len
CRC
Packet + ECC from host/client
40
44
46
48
50
42

Fig. 2

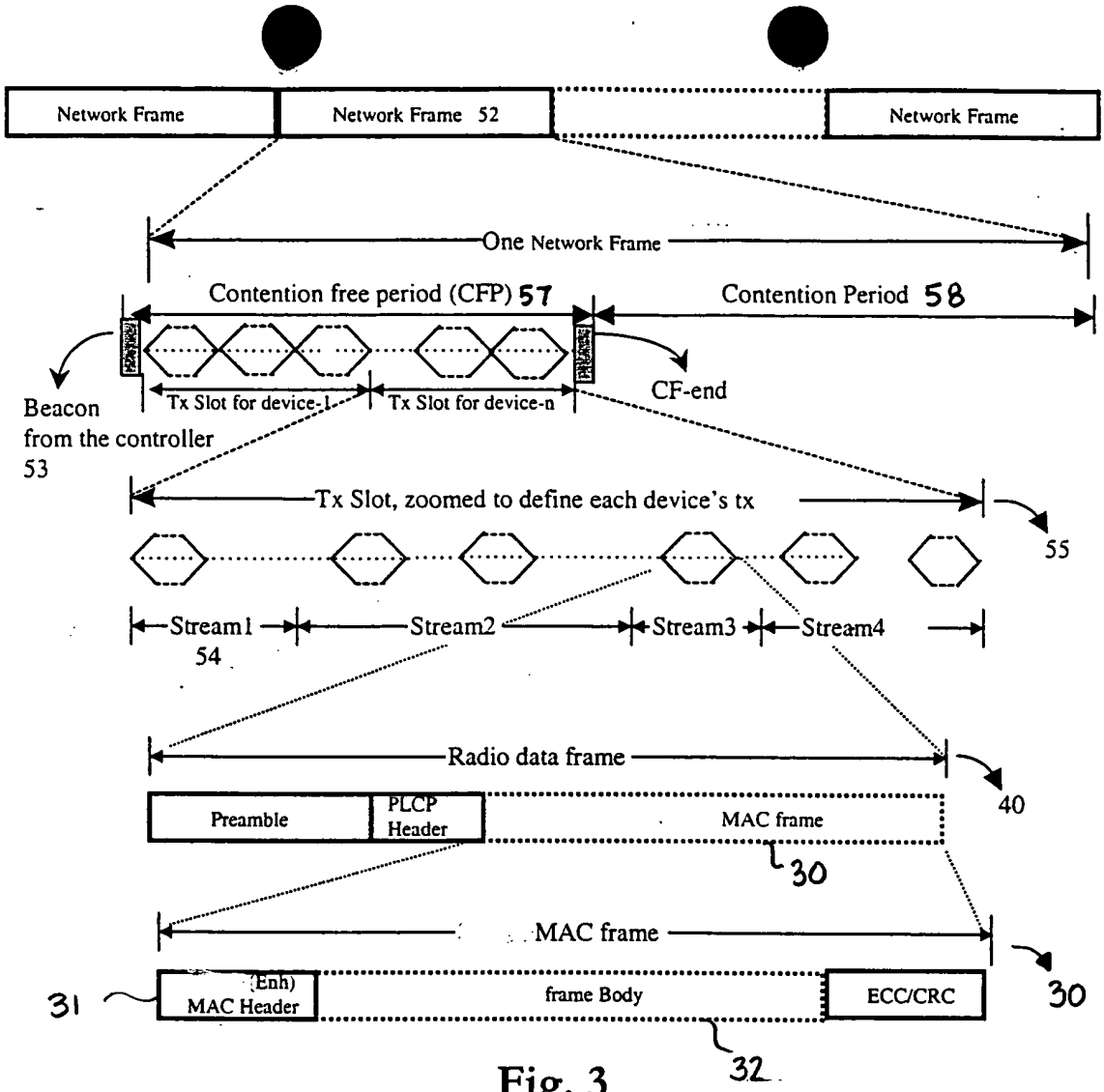

Network Frame
Network Frame 52
Network Frame
One Network Frame
Contention free period (CFP) 57
Contention Period 58
Beacon
from the controller
53
Tx Slot for device-1
Tx Slot for device-n
CF-end
Tx Slot, zoomed to define each device's tx
55
Stream1
54
Stream2
Stream3
Stream4
Radio data frame
40
Preamble
PLCP
Header
MAC frame
30
MAC frame
31
(Enh)
MAC Header
frame Body
ECC/CRC
30
32

Fig. 3

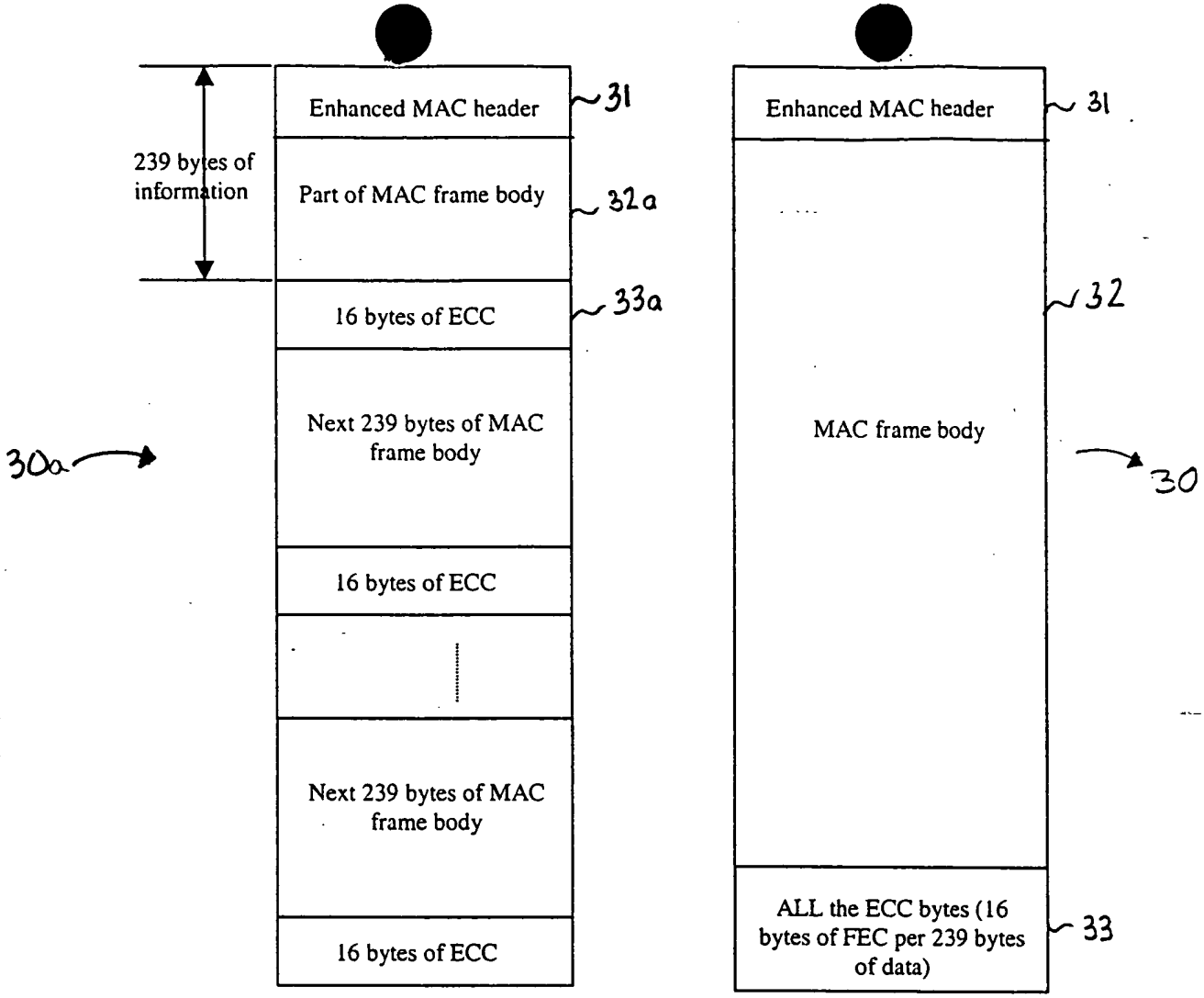

239 bytes of information
Enhanced MAC header
31
Part of MAC frame body
32a
16 bytes of ECC
33a
Next 239 bytes of MAC frame body
30a
16 bytes of ECC
Next 239 bytes of MAC frame body
16 bytes of ECC
(a) Interlaced MAC frame format
Enhanced MAC header
31
MAC frame body
32
30
ALL the ECC bytes (16 bytes of FEC per 239 bytes of data)
33
(a) Non-Interlaced MAC frame format

Fig. 4

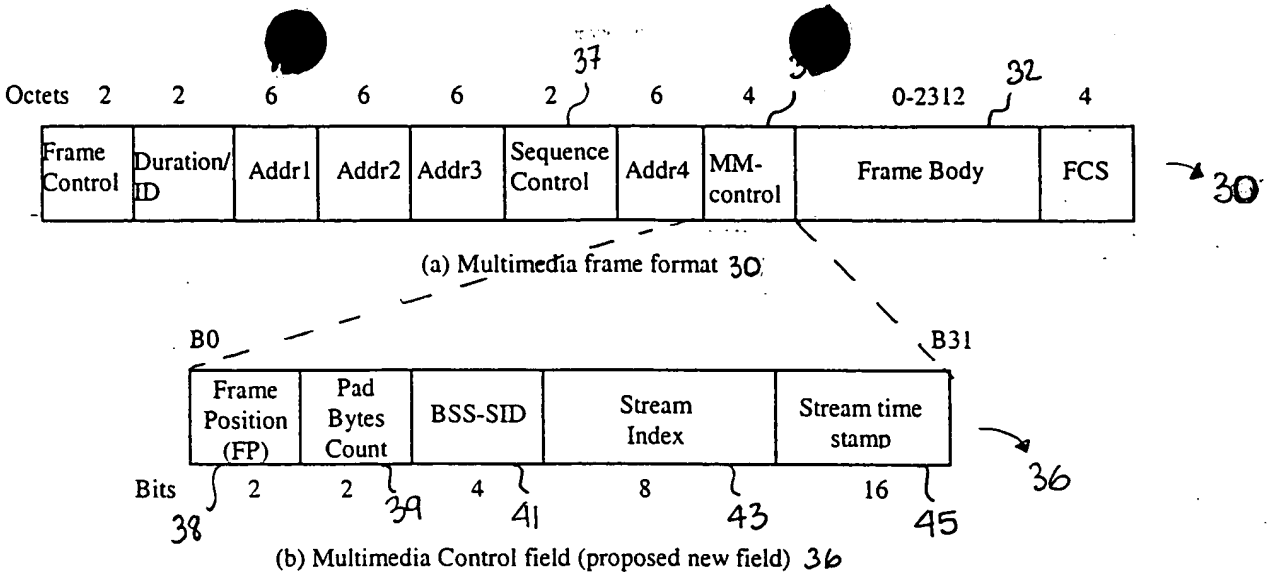

Octets 2 2 6 6 6 2 6 4 0-2312 4
Frame Control
Duration/ ID
Addr1
Addr2
Addr3
Sequence Control
Addr4
MM-control
Frame Body
FCS
30
37
32
(a) Multimedia frame format 30
B0
B31
Frame Position (FP)
Pad Bytes Count
BSS-SID
Stream Index
Stream time stamp
36
Bits 2 2 4 8 16
38
39
41
43
45
(b) Multimedia Control field (proposed new field) 36

Fig. 5

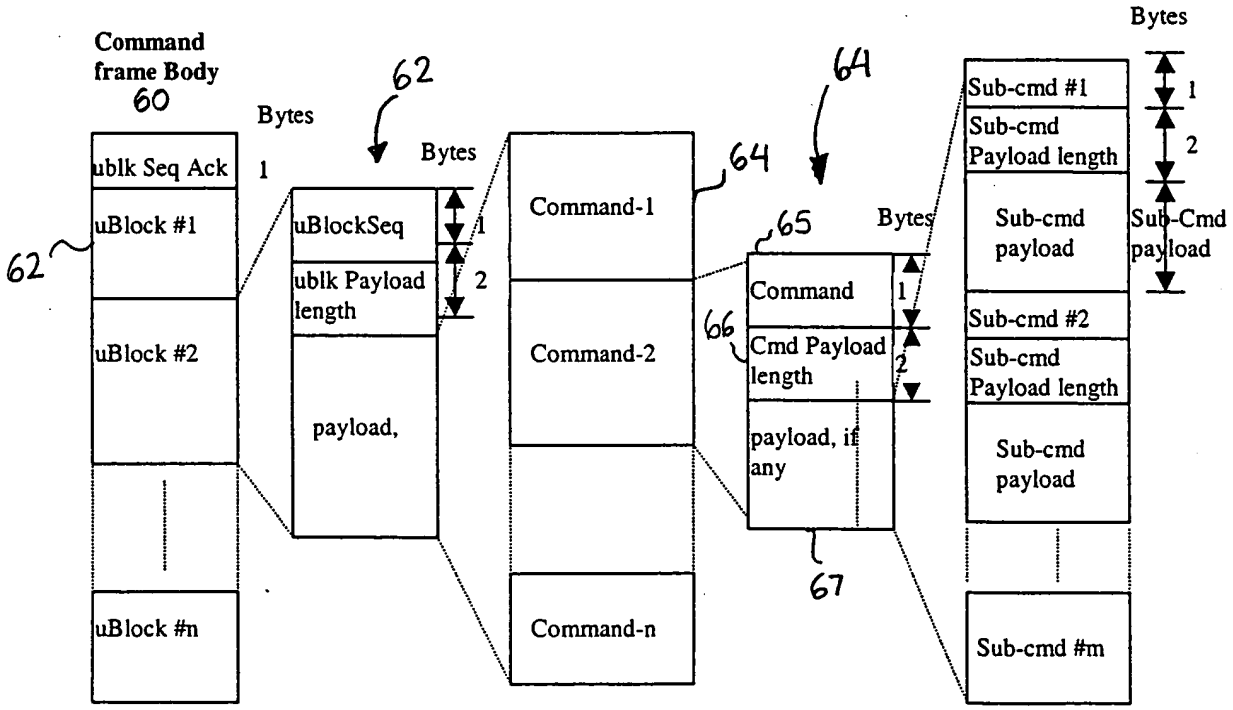

Command frame Body
60
Bytes
62
64
65
66
67
ublk Seq Ack
uBlock #1
uBlock #2
uBlock #n
uBlockSeq
ublk Payload length
payload,
Command-1
Command-2
Command-n
Command
Cmd Payload length
payload, if any
Sub-cmd #1
Sub-cmd Payload length
Sub-cmd payload
Sub-cmd #2
Sub-cmd #m
Sub-Cmd payload

Fig. 6

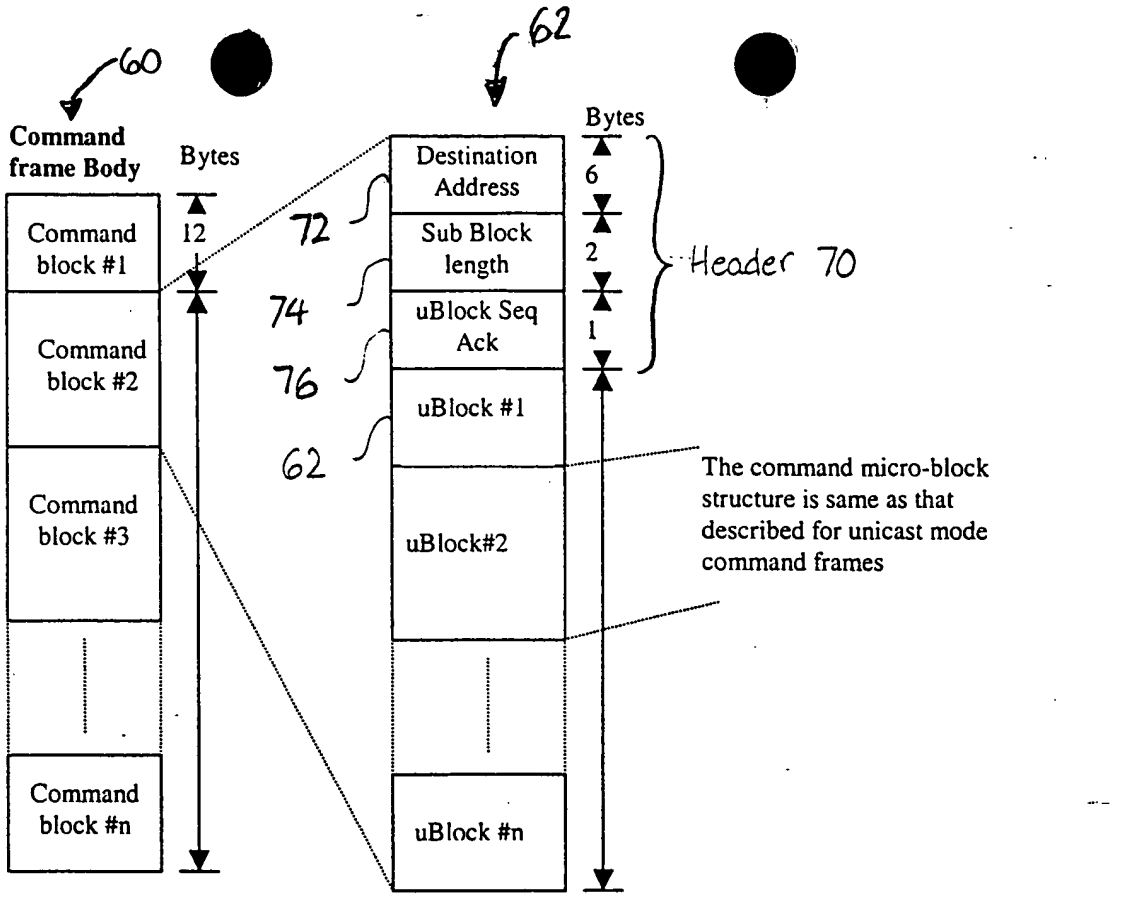


Fig. 7

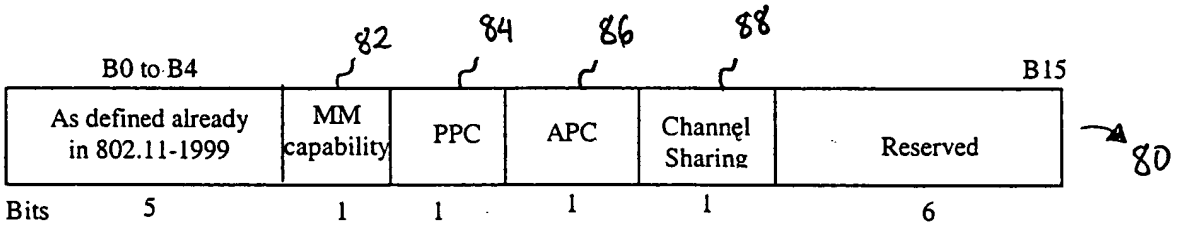


Fig. 8

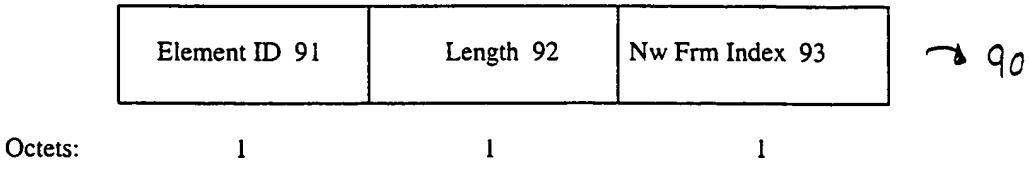


Fig. 9

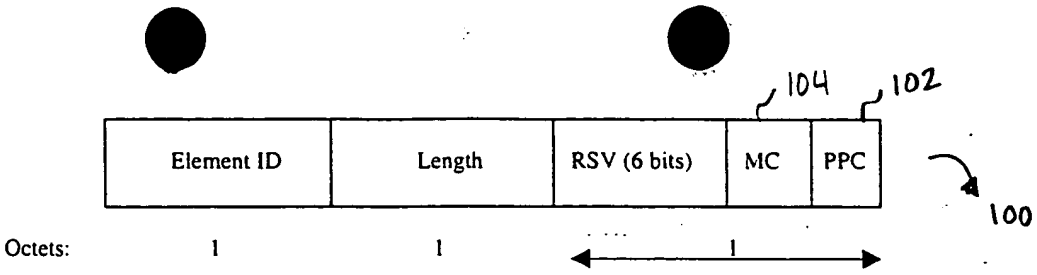


Fig. 10

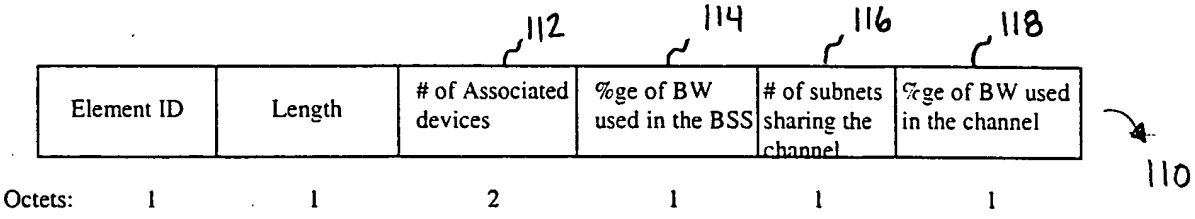


Fig. 11

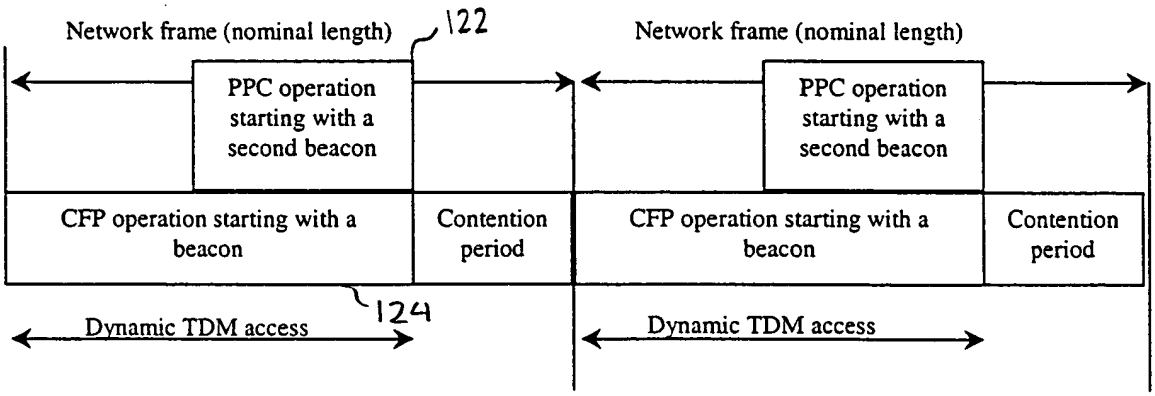


Fig. 12

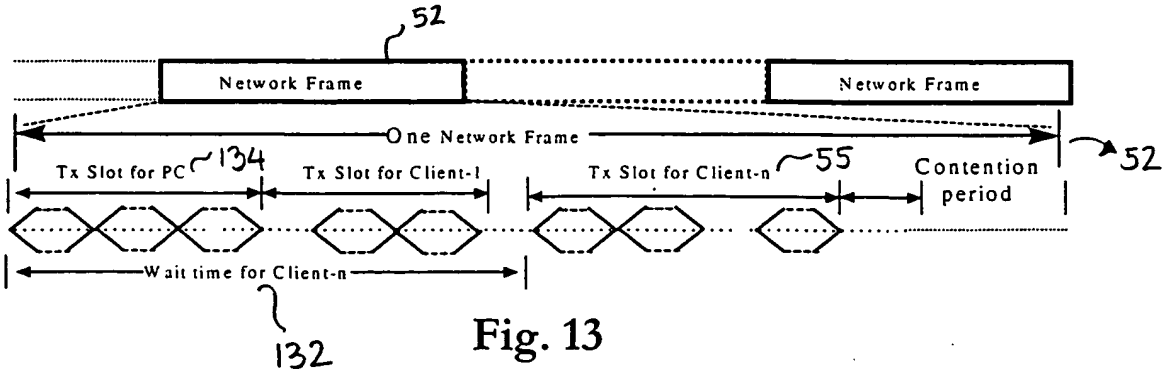


Fig. 13

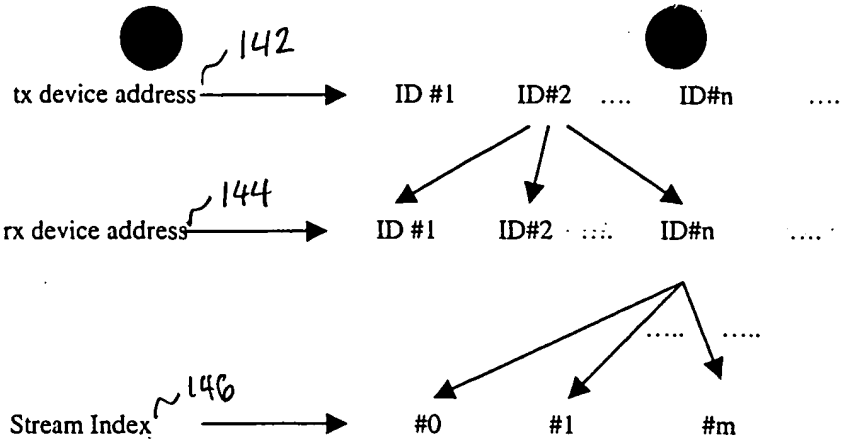

142
tx device address
ID #1
ID#2
....
ID#n
....
144
rx device address
ID #1
ID#2
ID#n
....
.....
.....
146
Stream Index
#0
#1
#m

Fig. 14

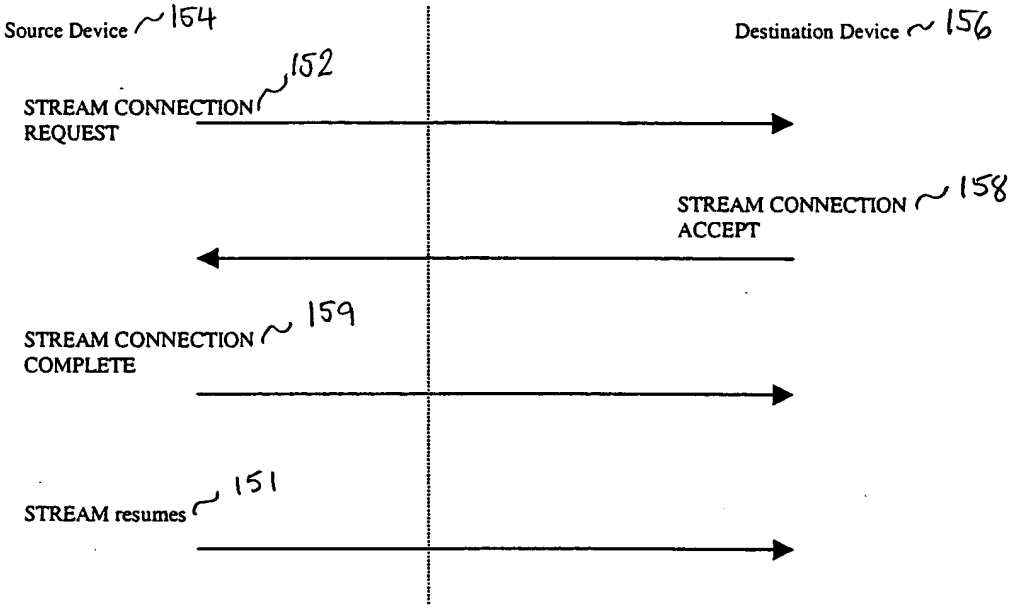

Source Device
154
Destination Device
156
152
STREAM CONNECTION REQUEST
STREAM CONNECTION ACCEPT
158
STREAM CONNECTION COMPLETE
159
STREAM resumes
151

Fig. 15

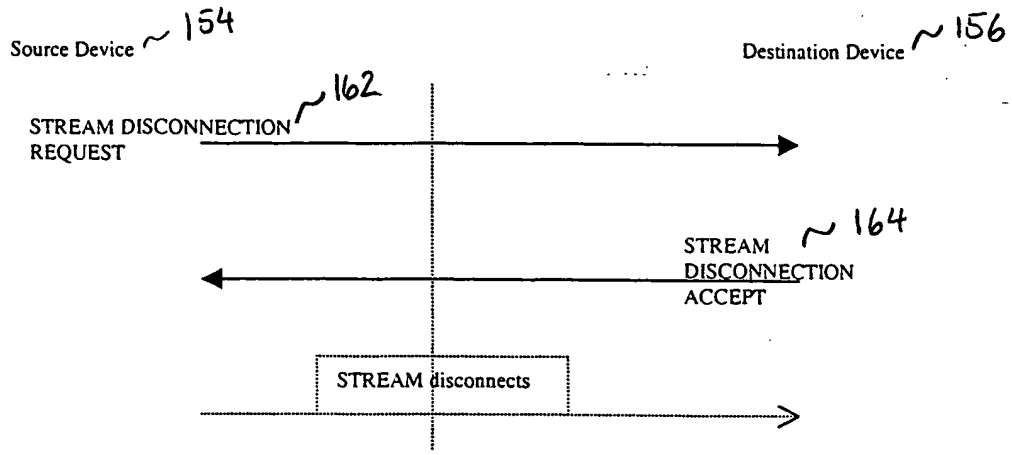

Source Device
154
Destination Device
156
STREAM DISCONNECTION REQUEST
162
STREAM DISCONNECTION ACCEPT
164
STREAM disconnects

Fig. 16

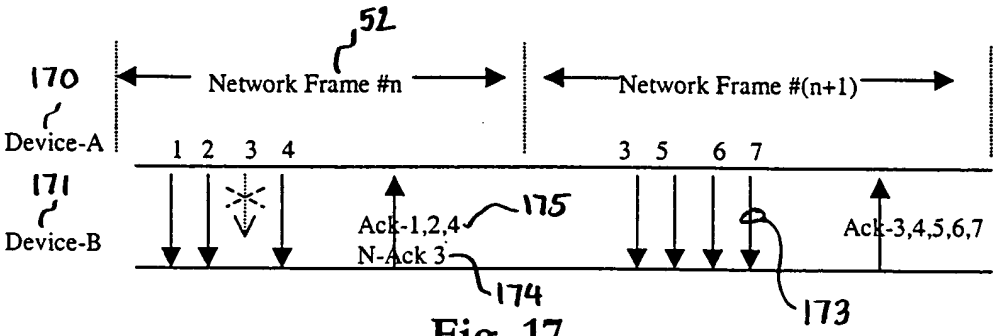
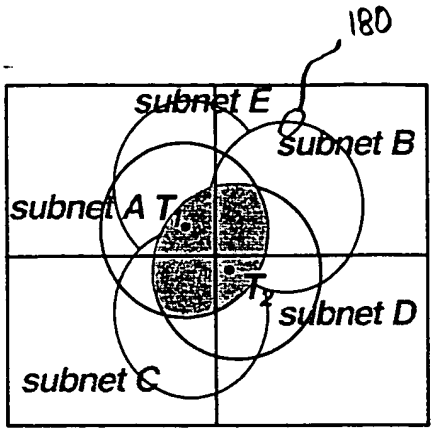
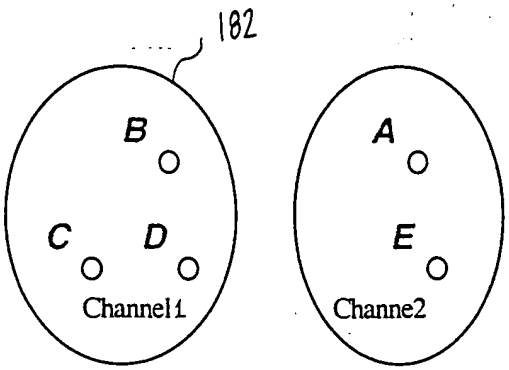

52
170
Device-A
171
Device-B
Network Frame #n
Network Frame #(n+1)
1 2 3 4
3 5 6 7
Ack-1,2,4
N-Ack 3
175
174
173
Ack-3,4,5,6,7

Fig. 17



(a) Physical location: Subnets A, B, C and D are in one plane and Subnet E is in another plane



(b) Logical location: Subnets B, C and D share channel-1and Subnet A and E share channel-2

- *Subnet B comes up first and assumes all zero BSS-SID in channel 1 with 10%bandwidth utilization*
- *Subnet A comes up next and assumes all zero BSS-SID in channel 2 with 80% bandwidth utilization*
- *Subnet D comes up:*
  - *Detects both channels being busy*
  - *Detects channel-1 with low bandwidth utilization and*
  - *Requests 30% bandwidth in channel-1*
  - *Subnet B and D share Channel 1 with 10% and 30% bandwidth usage respectively*
- *Subnet C comes up:*
  - *Detects both channels being busy*
  - *Detects channel-1 with low bandwidth utilization and*
  - *Requests 40% bandwidth in channel-1*
  - *Subnet B, C and D share Channel 1 with 10%, 40% and 30% bandwidth usage respectively*
- *Subnet E (not shown in picture) comes up:*
  - *Detects both channels being busy*
  - *Detects channel-1 and channel-2 with approximately same bandwidth utilization*
  - *Detects channel-2 with lower umber of subnets*
  - *Requests 40% bandwidth in channel-2.*

Fig. 18

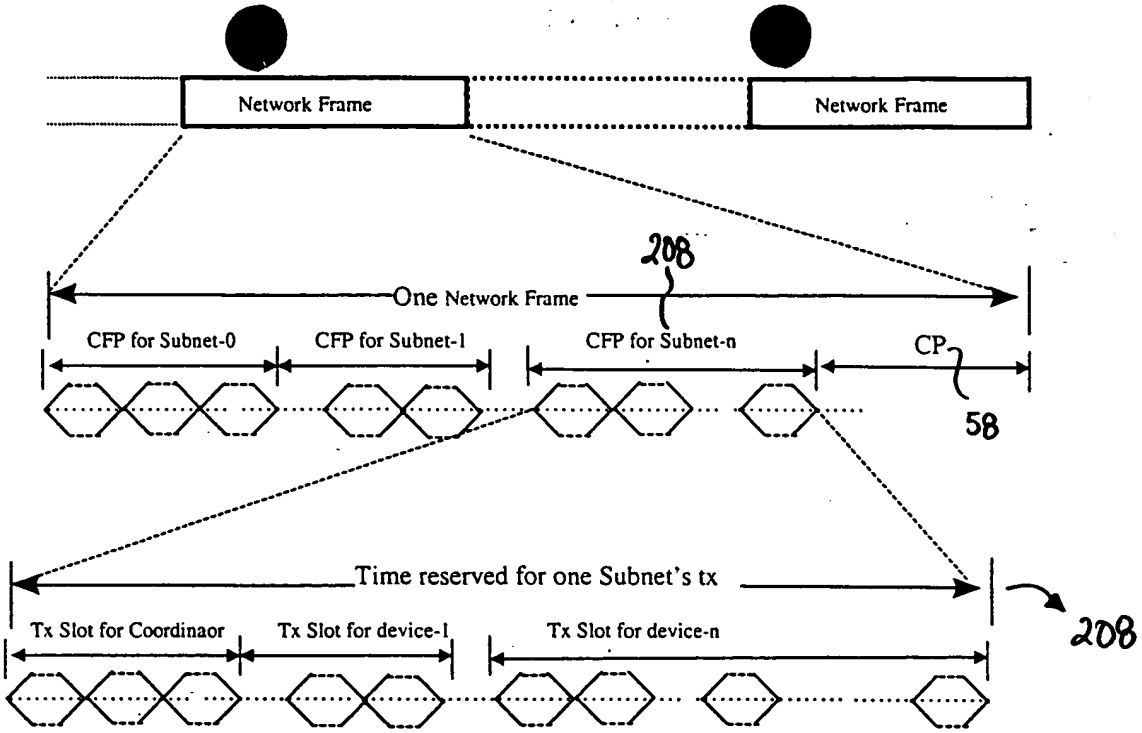

Network Frame
Network Frame
208
One Network Frame
CFP for Subnet-0
CFP for Subnet-1
CFP for Subnet-n
CP
58
Time reserved for one Subnet's tx
208
Tx Slot for Coordinaor
Tx Slot for device-1
Tx Slot for device-n

Fig. 19

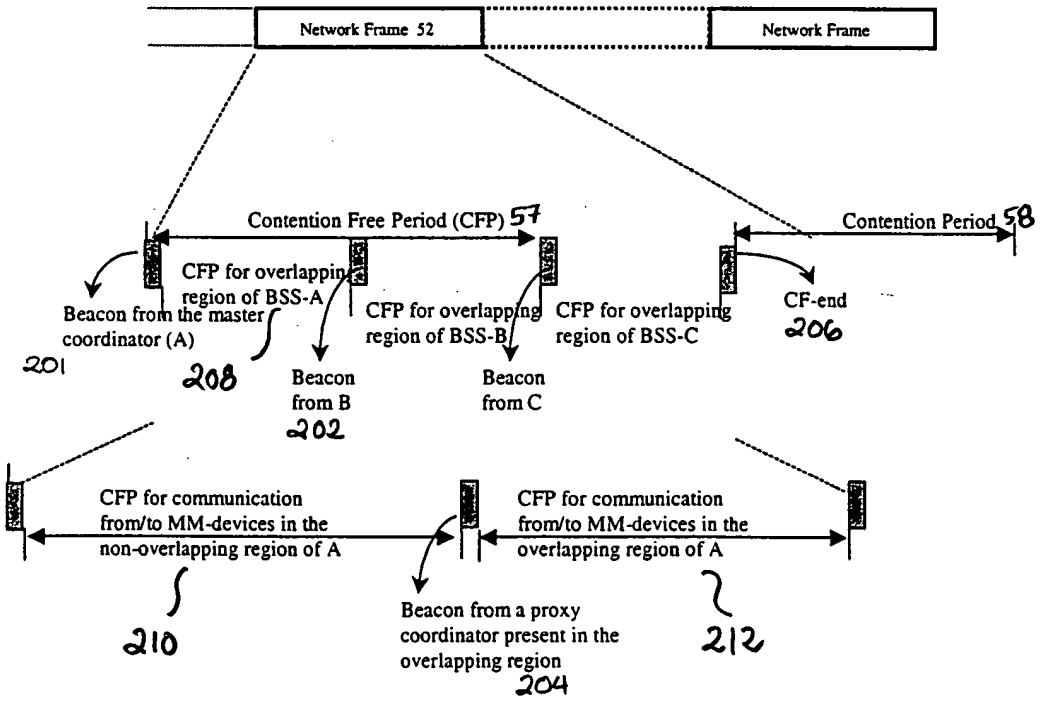
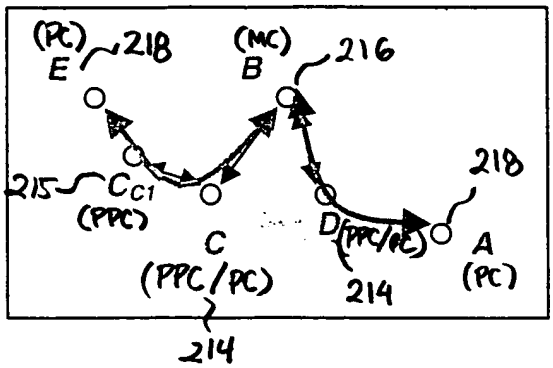

Network Frame 52
Network Frame
Contention Free Period (CFP) 57
Contention Period 58
CFP for overlapping region of BSS-A
Beacon from the master coordinator (A)
201
208
Beacon from B
202
CFP for overlapping region of BSS-B
Beacon from C
CFP for overlapping region of BSS-C
CF-end
206
CFP for communication from/to MM-devices in the non-overlapping region of A
210
Beacon from a proxy coordinator present in the overlapping region
204
CFP for communication from/to MM-devices in the overlapping region of A
212

Fig. 20



- *Subnet B comes up first and assumes all zero BSS-SID*
- *Subnet D comes up next and requests bandwidth sharing with B*
- *Subnet C comes up next and requests bandwidth sharing with B and D*
- *Subnet A comes up:*
  - *Subnet B can not detect A and/or A can not detect B*
  - *Subnet D detects both and reports to B that A is operating in the same channel*
  - *B assigns D to be proxy coordinator and sends request to D for bandwidth sharing. If A can detect any packets from B or D it can also send the same request.*
  - *D acts as tunnel between B and A.*
  - *A gets a invitation from B to join the already group existing group of B, C and D.*
  - *A gets assigned an SS-ID and its transmission always follows that of D*
- *Subnet E comes up:*
  - *Except C_{cl}, no other device can detect E and or otherwise*
  - *E tries to use another channel and fails*
  - *There is only one option to E and that is to join the same group formed above, else it will be interfering with C_{cl}.*
  - *C_{cl}.detects request from E and reports to C that E is operating in the same channel*
  - *C tunnels the information to B.*
  - *B assigns C_{cl} to be proxy coordinator and sends request to C for permission.*
  - *C authenticates the request and provides the permission.*
  - *C and C_{cl} together form a tunnel between B and E.*
  - *E gets assigned an SS-ID and its transmission always follows that of C_{cl}*

Fig. 21

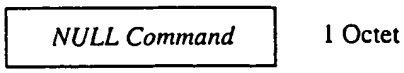


Fig. 22

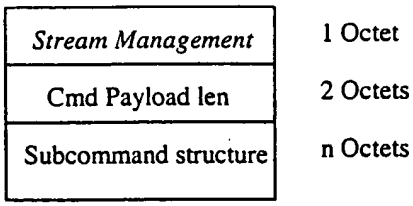


Fig. 23

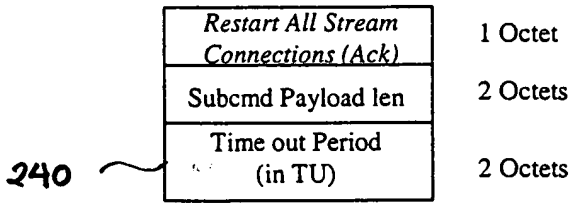


Fig. 24

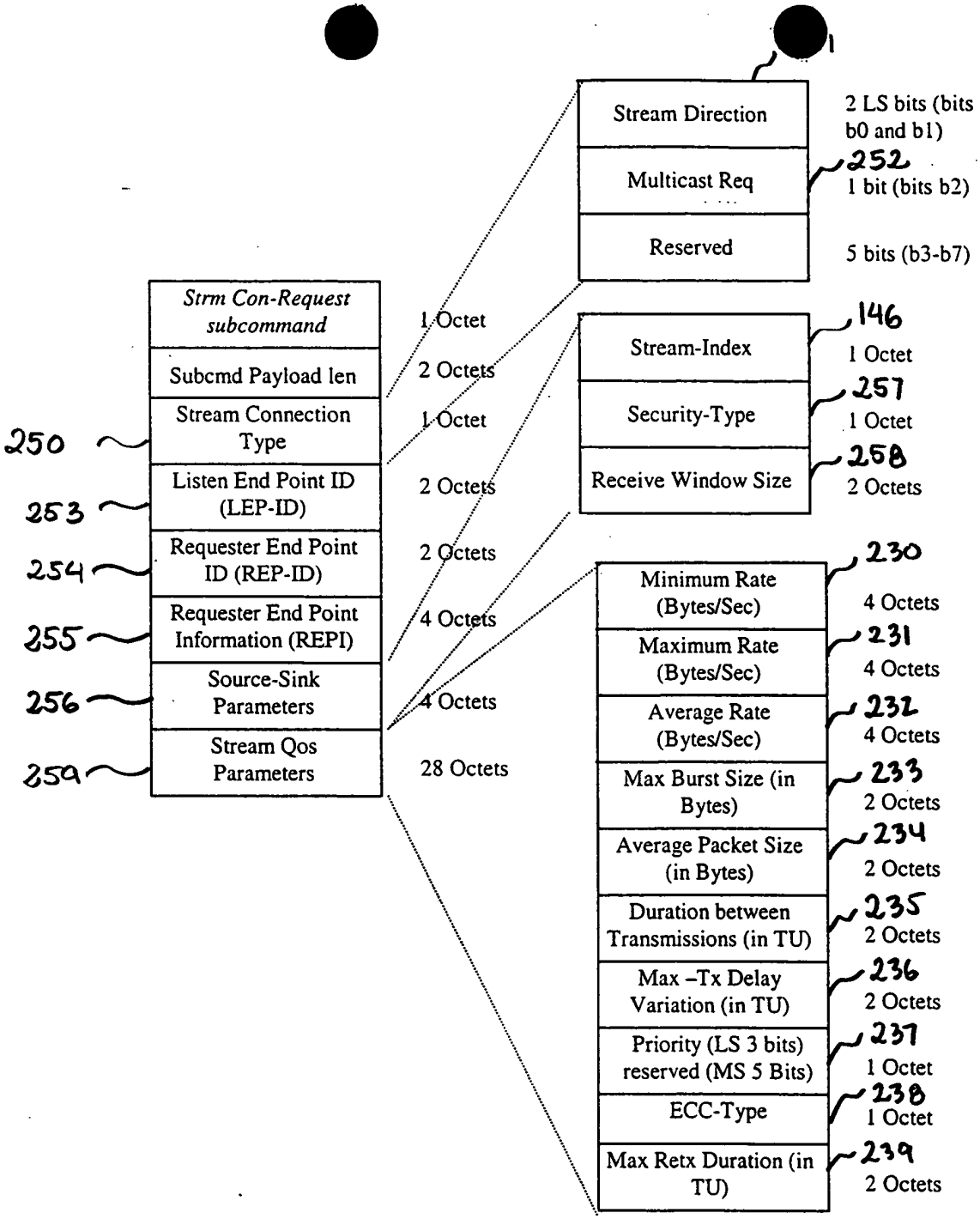

Strm Con-Request subcommand
1 Octet
Subcmd Payload len
2 Octets
Stream Connection Type
1 Octet
250
Listen End Point ID (LEP-ID)
2 Octets
253
Requester End Point ID (REP-ID)
2 Octets
254
Requester End Point Information (REPI)
4 Octets
255
Source-Sink Parameters
4 Octets
256
Stream Qos Parameters
28 Octets
259
Stream Direction
2 LS bits (bits b0 and b1)
Multicast Req
252
1 bit (bits b2)
Reserved
5 bits (b3-b7)
Stream-Index
146
1 Octet
Security-Type
257
1 Octet
Receive Window Size
258
2 Octets
Minimum Rate (Bytes/Sec)
230
4 Octets
Maximum Rate (Bytes/Sec)
231
4 Octets
Average Rate (Bytes/Sec)
232
4 Octets
Max Burst Size (in Bytes)
233
2 Octets
Average Packet Size (in Bytes)
234
2 Octets
Duration between Transmissions (in TU)
235
2 Octets
Max –Tx Delay Variation (in TU)
236
2 Octets
Priority (LS 3 bits) reserved (MS 5 Bits)
237
1 Octet
ECC-Type
238
1 Octet
Max Retx Duration (in TU)
239
2 Octets

Fig. 25

Strm Con-Request subcommand	1 Octet
Subcmd Payload len	2 Octets
Stream Connection Type	1 Octet
Listen End Point ID (LEP-ID)	2 Octets
Requester End Point ID (REP-ID)	2 Octets
Requester End Point Information (REPI)	4 Octets
Source-Sink Params for Tx-stream	4 Octets
Stream Qos Params for Tx-Stream	28 Octets
Source-Sink Params for Rx-stream	4 Octets
Stream Qos Params for Rx-Stream	28 Octets

Fig. 26

Stream Direction is '1' or '2'

Strm Connection Accept subcommand	1 Octet
Subcmd Payload len	2 Octets
Stream Connection Type	1 Octet
Listen End Point ID (LEP-ID)	2 Octets
Requester End Point ID (REP-ID)	2 Octets
Acceptor End Point ID (AEP-ID)	2 Octets
Acceptor End Point Information (AEPI)	4 Octets
Source-Sink Params for stream	4 Octets
Stream Qos Params for Stream	28 Octets

270

272

Stream Direction is '3'

Strm Connection Accept subcommand	1 Octet
Subcmd Payload len	2 Octets
Stream Connection Type	1 Octet
Listen End Point ID (LEP-ID)	2 Octets
Requester End Point ID (REP-ID)	2 Octets
Acceptor End Point ID (AEP-ID)	2 Octets
Acceptor End Point Information (AEPI)	4 Octets
Source-Sink Params for Tx-stream	4 Octets
Stream Qos Params for Tx-Stream	28 Octets
Source-Sink Params for Rx-stream	4 Octets
Stream Qos Params for Rx-Stream	28 Octets

Fig. 27

Stream Direction is '1' or '2' or 3

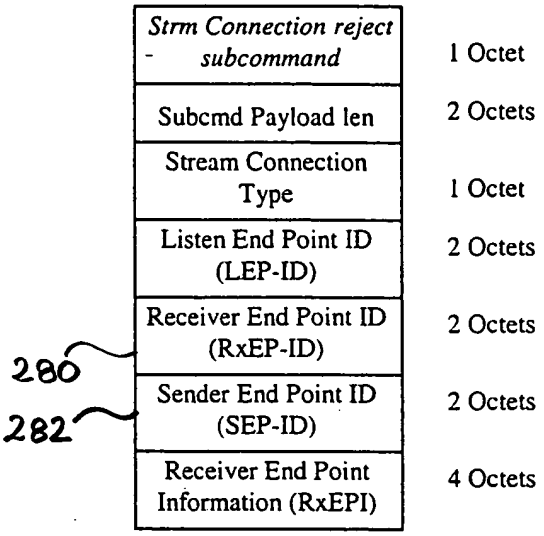


Fig. 28

Stream Direction is '1' or '2' or '3'

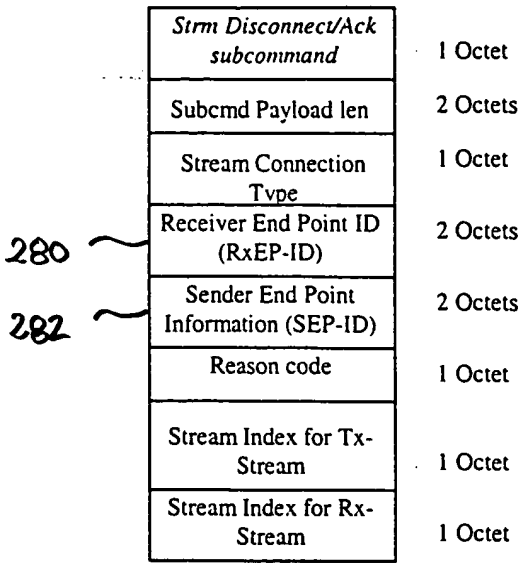


Fig. 29

Stream Direction is '1' or '2'

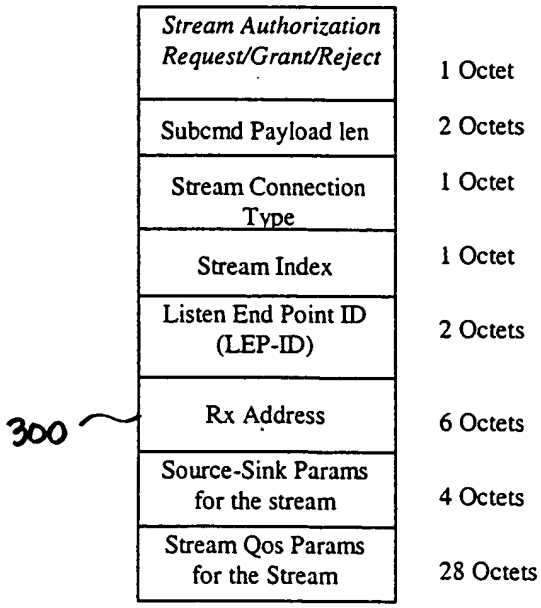


Fig. 30

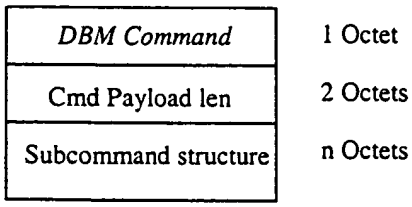


Fig. 31

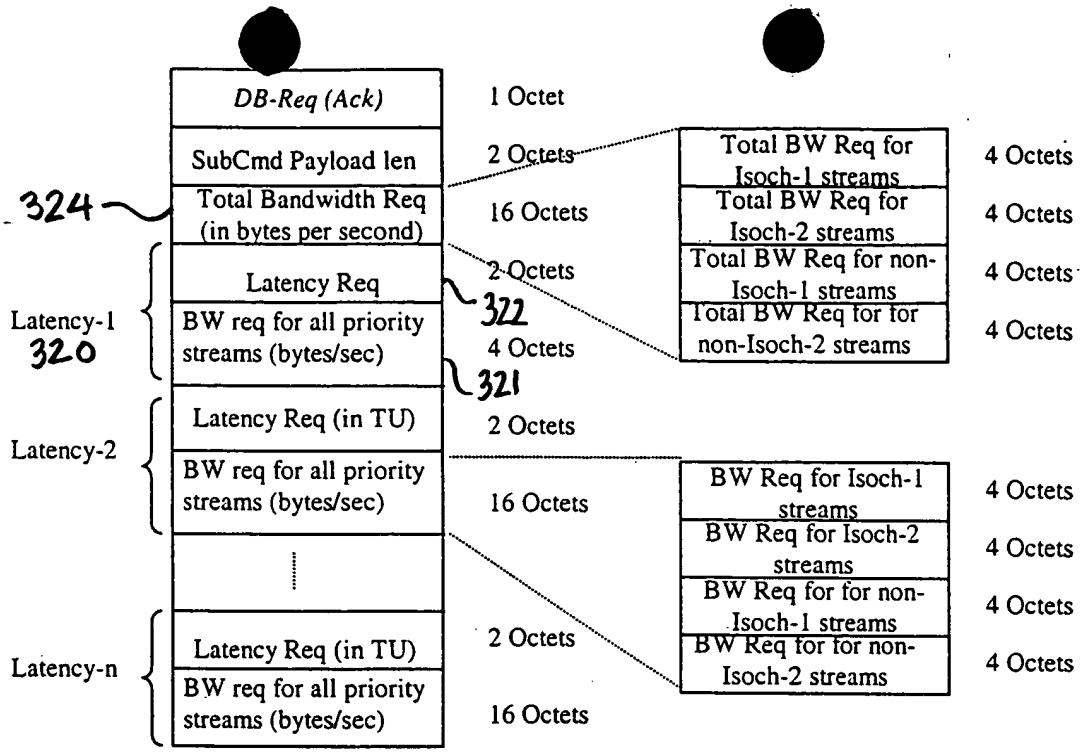

DB-Req (Ack)
1 Octet
SubCmd Payload len
2 Octets
324
Total Bandwidth Req (in bytes per second)
16 Octets
Latency Req
2 Octets
322
Latency-1
320
BW req for all priority streams (bytes/sec)
4 Octets
321
Latency Req (in TU)
2 Octets
Latency-2
BW req for all priority streams (bytes/sec)
16 Octets
Latency Req (in TU)
2 Octets
Latency-n
BW req for all priority streams (bytes/sec)
16 Octets
Total BW Req for Isoch-1 streams
4 Octets
Total BW Req for Isoch-2 streams
4 Octets
Total BW Req for non-Isoch-1 streams
4 Octets
Total BW Req for for non-Isoch-2 streams
4 Octets
BW Req for Isoch-1 streams
4 Octets
BW Req for Isoch-2 streams
4 Octets
BW Req for for non-Isoch-1 streams
4 Octets
BW Req for for non-Isoch-2 streams
4 Octets

Fig. 32

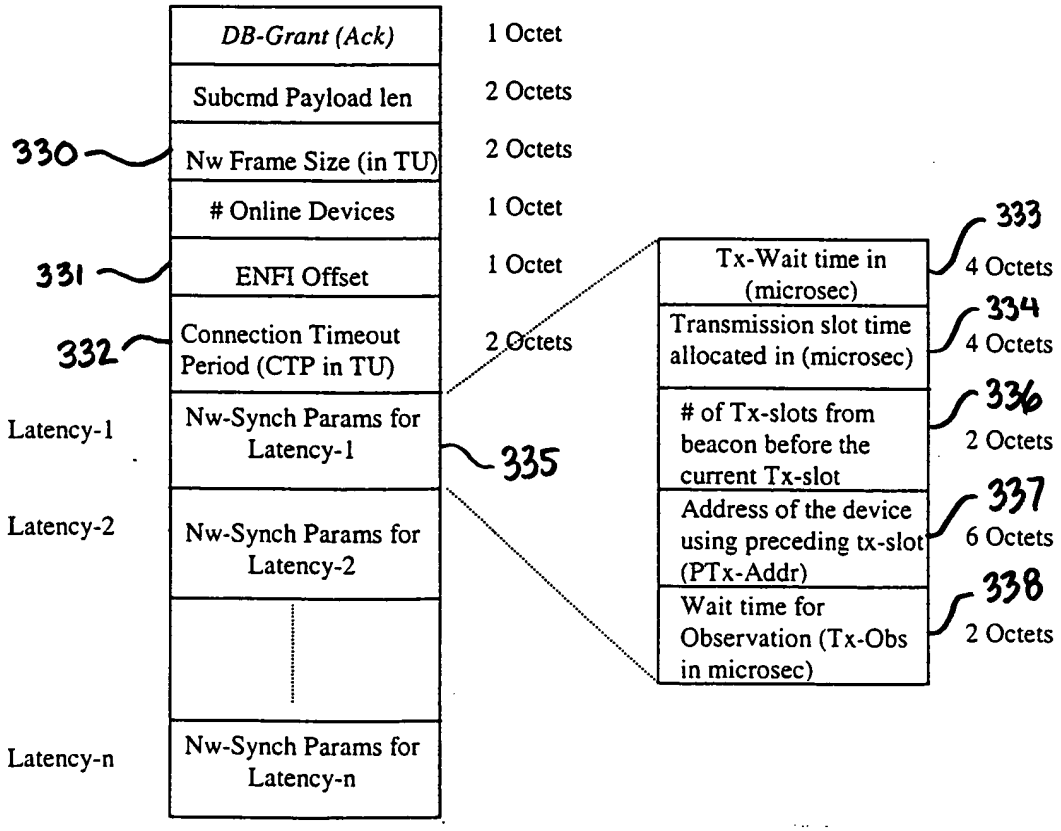

DB-Grant (Ack)
1 Octet
Subcmd Payload len
2 Octets
330
Nw Frame Size (in TU)
2 Octets
Online Devices
1 Octet
331
ENFI Offset
1 Octet
332
Connection Timeout Period (CTP in TU)
2 Octets
Latency-1
Nw-Synch Params for Latency-1
335
Latency-2
Nw-Synch Params for Latency-2
Latency-n
Nw-Synch Params for Latency-n
Tx-Wait time in (microsec)
333
4 Octets
Transmission slot time allocated in (microsec)
334
4 Octets
# of Tx-slots from beacon before the current Tx-slot
336
2 Octets
Address of the device using preceding tx-slot (PTx-Addr)
337
6 Octets
Wait time for Observation (Tx-Obs in microsec)
338
2 Octets

Fig. 33

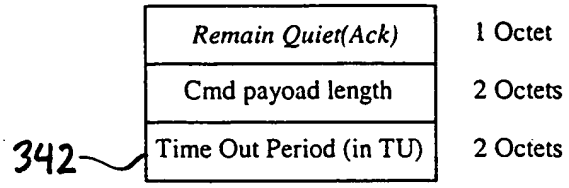


Fig. 34

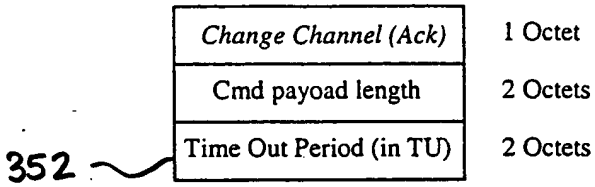


Fig. 35

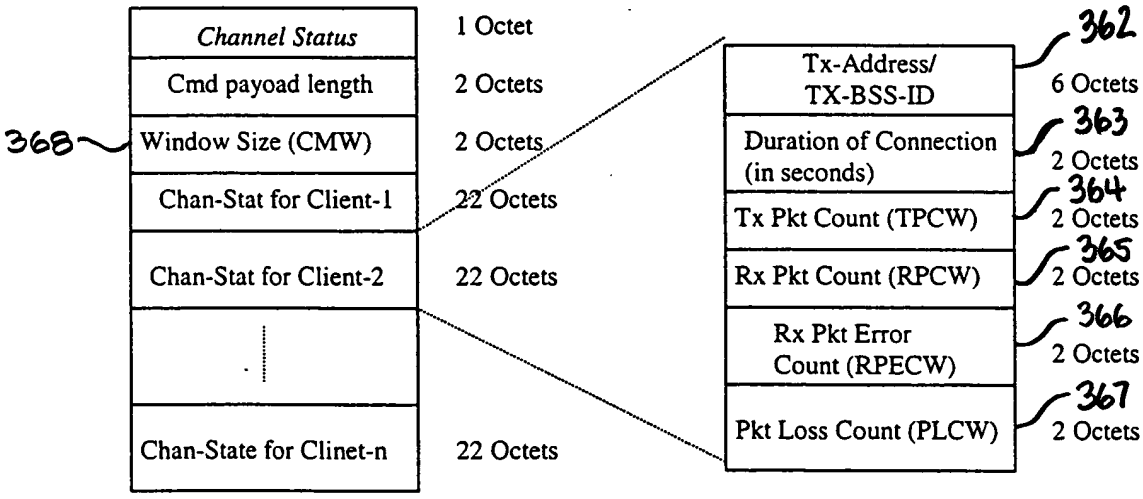


Fig. 36

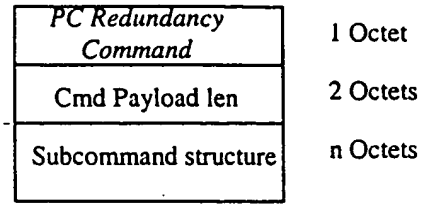


Fig. 37

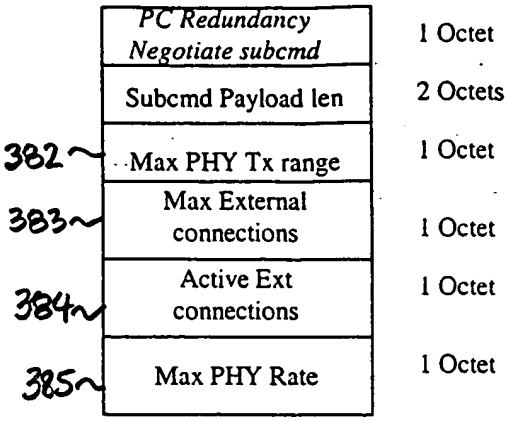


Fig. 38

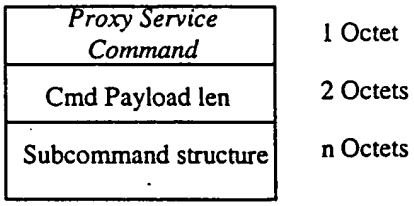


Fig. 39

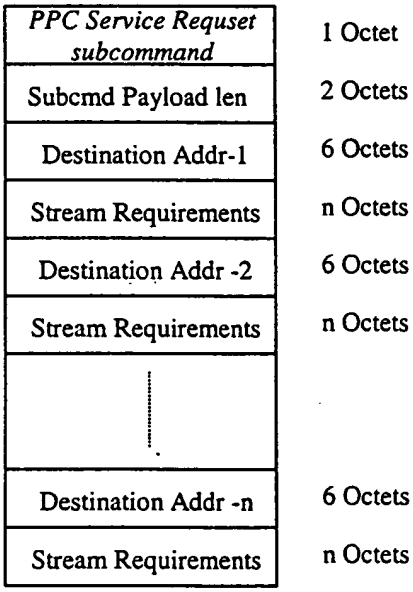


Fig. 40

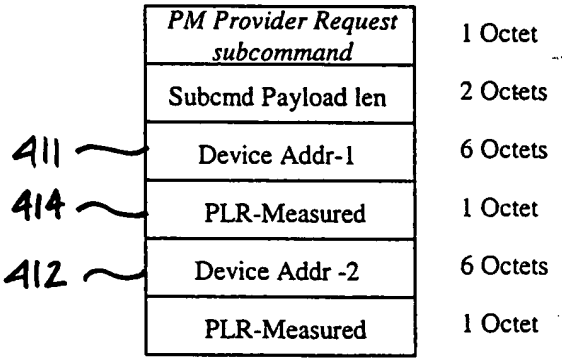


Fig. 41

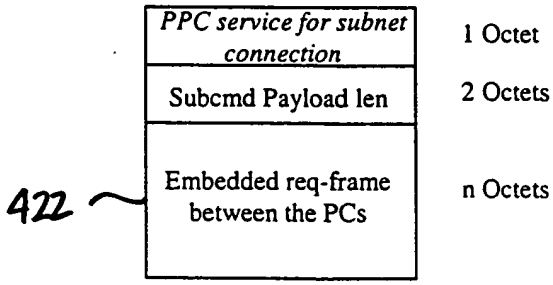


Fig. 42

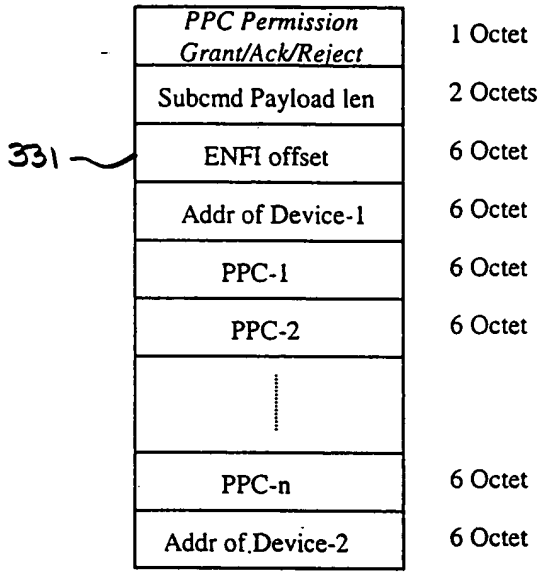


Fig. 43

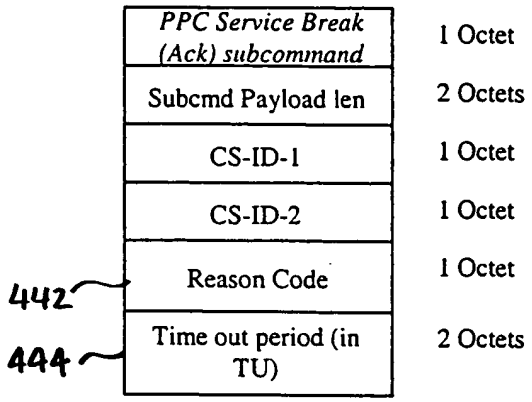


Fig. 44

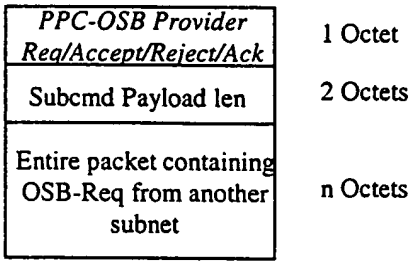


Fig. 45

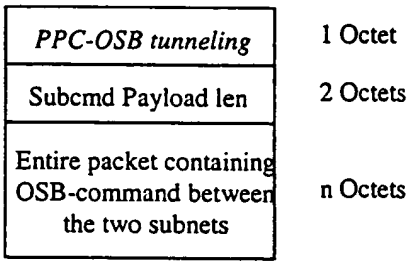


Fig. 46

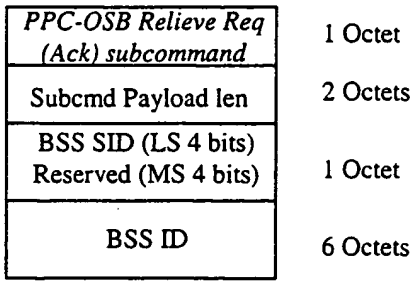


Fig. 47

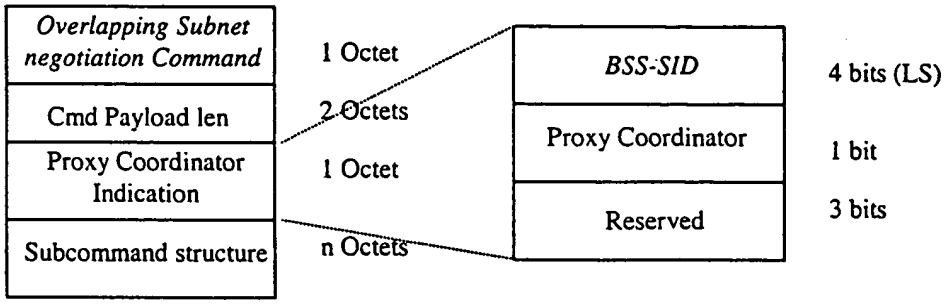

Overlapping Subnet negotiation Command
Cmd Payload len
Proxy Coordinator Indication
Subcommand structure
1 Octet
2 Octets
1 Octet
n Octets
BSS-SID
Proxy Coordinator
Reserved
4 bits (LS)
1 bit
3 bits

Fig. 48

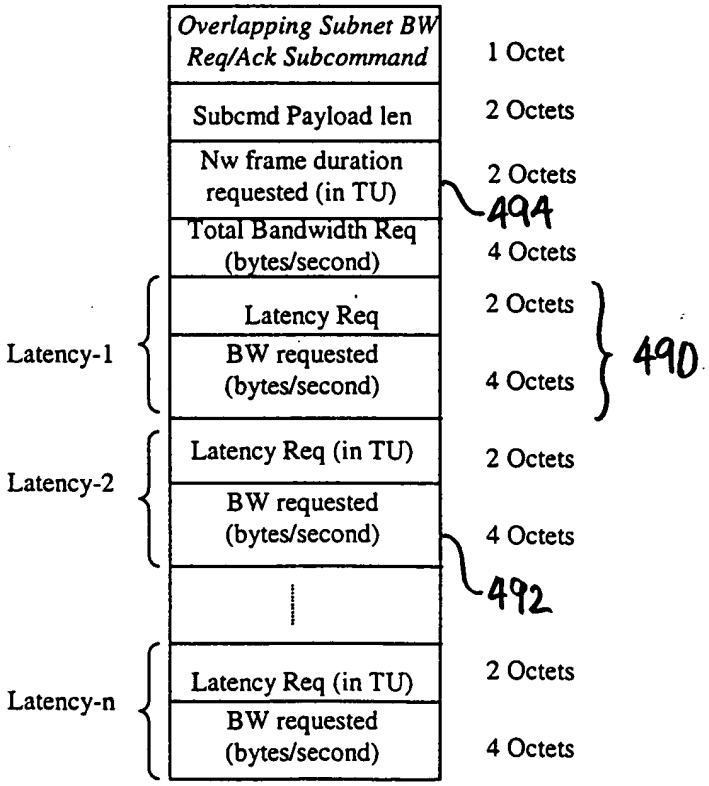

Overlapping Subnet BW Req/Ack Subcommand
Subcmd Payload len
Nw frame duration requested (in TU)
Total Bandwidth Req (bytes/second)
Latency-1
Latency Req
BW requested (bytes/second)
Latency-2
Latency Req (in TU)
BW requested (bytes/second)
Latency-n
Latency Req (in TU)
BW requested (bytes/second)
1 Octet
2 Octets
2 Octets
4 Octets
2 Octets
4 Octets
2 Octets
4 Octets
2 Octets
4 Octets
494
490
492

Fig. 49

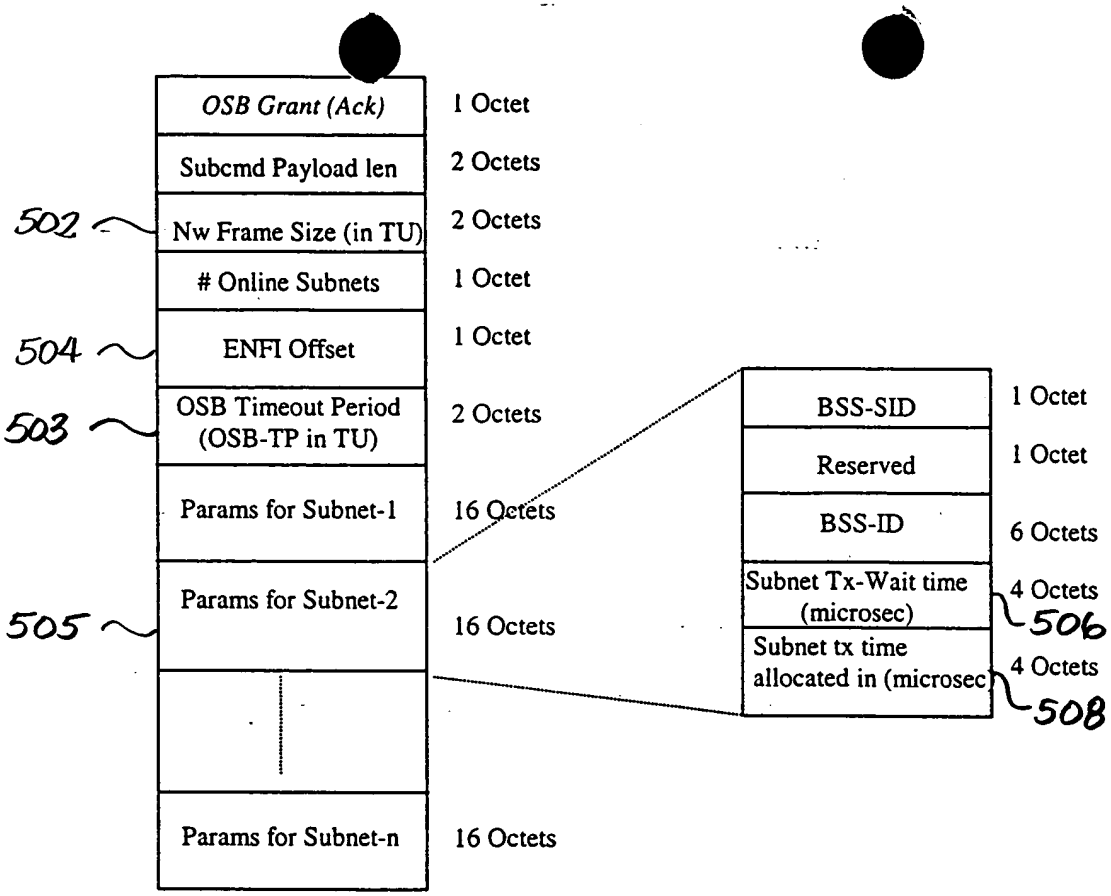


Fig. 50

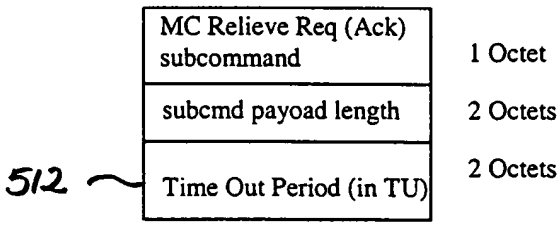


Fig. 51

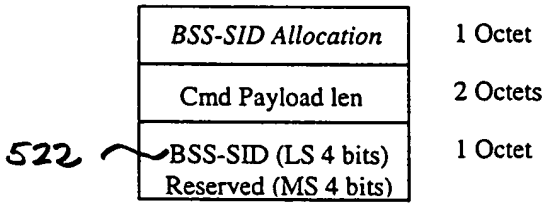


Fig. 52

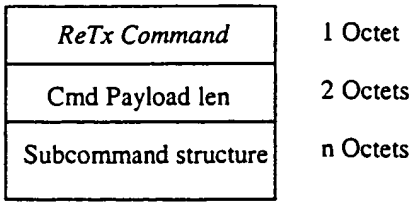


Fig. 53

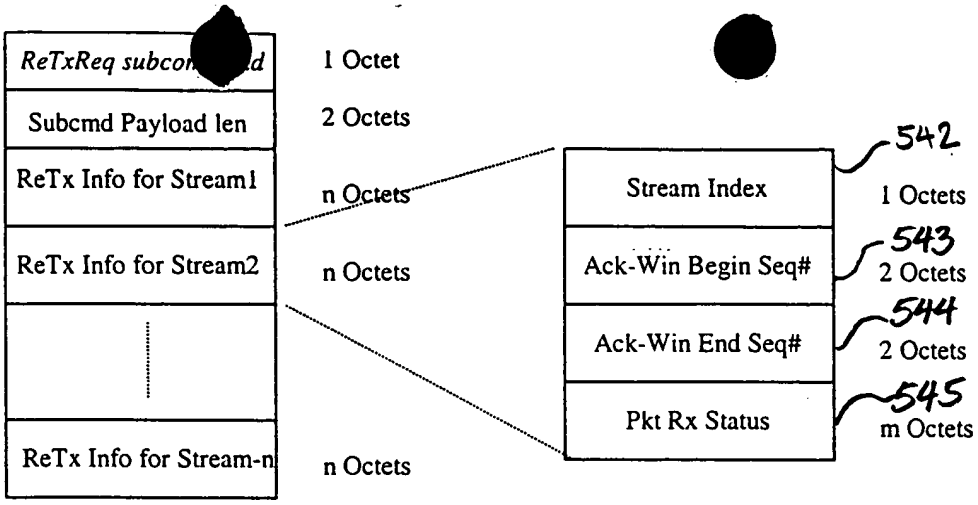


Fig. 54

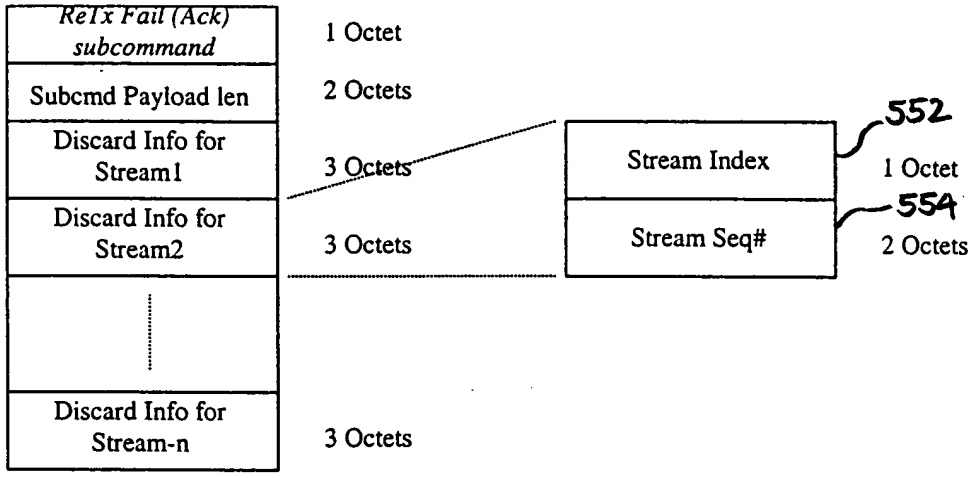


Fig. 55

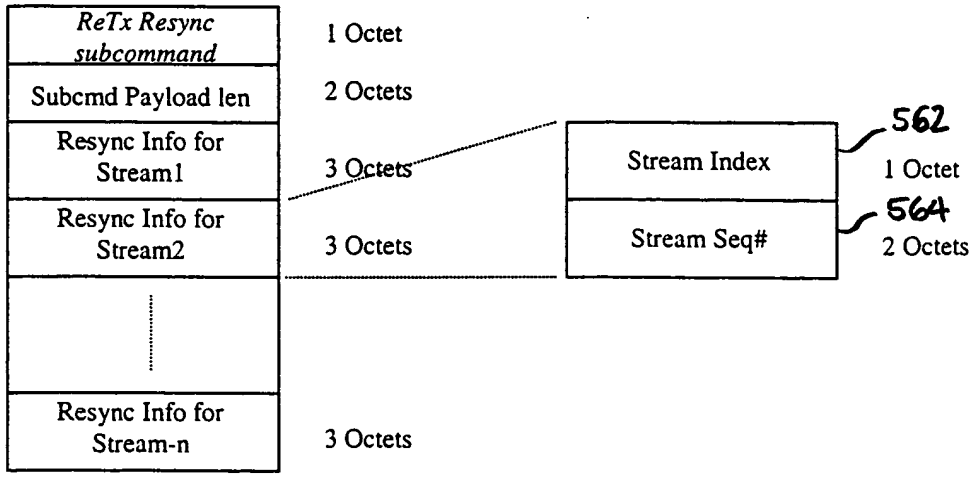


Fig. 56